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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/691,102

10/22/2003

Ulrich Kroll

35121US1

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7590

12/28/2005

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CLEVELAND, OH 44114-3108

EXAMINER

MULPURI, SAVITRI

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 12/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/691,102	Applicant(s) KROLL ET AL.	
	Examiner Savitri Mulpuri	Art Unit 2812	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 03 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-9, 14-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-9 and 14-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This action is in response to the applicant's communication amending the claims, filed on 10/3//2005.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-9, 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Catalano (US 4,845,043) in combination with Yamazaki (US 5,512,102).

Catalano discloses a method of making a PIN semiconductor device by depositing at least a layer doped with a doping agent and a layer of another type deposited on said doped layer in a single reaction chamber, wherein the deposition steps of said layers are separated by a dosing operation for avoiding the contamination by the doping agent of said another layer. Catalano teaches a boron doped silicon layer and then dosing (flushing) with a gaseous mixture capable of reaction with excess doping contaminants prior to the deposition of an intrinsic silicon layer (see abstract). Catalano further discloses performing the dosing at a temperature in the range of 200-300 °C, pressure 0.5 torr (0.666 millibar), for a time period of 10 minutes³, wherein reactive gases are NH_2F ; NHCl_2 ; NH_2Cl etc., (see col.5, lines 10-25).

Catalano does not disclose the recited compounds such as water, methanol, or isopropanol or another alcohol as claimed in claim 3 or ammonia or hydrazine or volatile organic amines as claimed in claim 4 in the flushing operation.

Yamazaki discloses depositing doped and undoped silicon layers to form p-i-n structures for solar cells by simultaneously using hydrogen or halogen to neutralize the recombination centers to improve the device characteristics(see col. 1, lines 45-54) Yamazaki also discloses several nonproductive gas compounds such as water (H_2O) or ammonia (NH_3) or hydrazine (N_2H_4) along with nitrogen trifluoride(NF_3) or dinitrogen hexafluoride (N_2F_6) to provide hydrogen or halogen elements (see col.2, lines 42-51). Yamazaki teaches cleaning the surface of the substrate by providing active hydrogen or fluorine or chlorine to remove the contaminants such as dust or oxide and then grow the semiconductor layer for the benefit of producing high quality layers (see col. 13, lines 62-67 and col. 14, lines 1-7). Since Yamazaki teaches water or ammonia or hydrazine or nitrogen fluoride are the compounds as art recognized equivalents to generate active hydrogen or halogen to remove contaminants, nitrogen fluoride can be replaced with either water (as in claim 3) or ammonia or hydrazine (as in claim 4) in the invention of Catalano to remove the contaminants.

It would have been obvious to one of ordinary skill in the art to provide active hydrogen from one of the compounds such as water or ammonia or hydrazine or active halogen element from the nitrogen trifluoride or dinitrogen hexafluoride in the invention of Catalano to remove the contaminants and to obtain high quality silicon layers because such compounds are as art recognized equivalents to form active hydrogen or

halogen elements to remove the contaminants on the surface of the substrate as taught by Yamazaki.

Claims 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over catalano in combination with Yamazaki as applied to claims 3-9, 10-15 above, and further in view of Bauer et al (US 6,124,545).

Catalano does not teach trimethylboron as dopant source. Bauer et al teaches B_2H_6 or trimethylboron as a dopant source for p-l-n or n-l-p structures(see col.3, lines 42-47). It would have been obvious to one of ordinary skill in the art to use trimethyl boron as precursor for doping because Bauer teaches the art recognized equivalents of B_2H_6 or trimethylboron as dopant source.

Applicant's arguments with respect to claims 3-10, 10-16 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Savitri Mulpuri whose telephone number is 571-272-1677. The examiner can normally be reached on Mon-Fri from 8 a.m. to 4.30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt, can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Savitri Mulpuri
Primary Examiner
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